Pioneer Mission Support

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This article reports on activities of DSN Operations in support of Pioneers 6 through 11 and Pioneer-Venus (Pioneer 12) for the period October 15 through December 15, 1979.

I. Introduction

This article reports on the continuing Deep Space Network support of Pioneer Mission Operations. Included in this article is information on the cruise phases of Pioneers 6-9, Pioneer 10, post-encounter coverage of Pioneer 11, Pioneer 12 orbital operations, and other mission-related activities.

II. Mission Operations and Status

A. Pioneers 6 through 9

During this period, all Pioneer spacecraft 6 through 9 appear to be healthy and functioning nominally. Only Pioneer 9 was tracked during this period over DSS 14 (Goldstone, California). See Table 1 for tracking time. A Pioneer 8 track was scheduled, but was cancelled because the required 100-kW transmitter (64-meter station) was not available during the scheduled track time.

B. Pioneer 10

The Pioneer 10 spacecraft continues on its course out of the solar system at an asymptote of 2.9 degrees above the ecliptic. All onboard systems are functioning nominally. The round-trip light time for Pioneer 10 at this time is approximately 5 hours, 24 minutes. That would put Pioneer 10's distance from Earth at 2,908,900,000 kilometers (1,807,900,000 miles). Tracking time for September and October is shown in Table 1.

C. Pioneer 11

Following its Saturn encounter, the Pioneer 11 spacecraft began its trek out of the ecliptic at an asymptote four times greater than that of Pioneer 10 (12.6 degrees) and in the opposite direction of its sister ship. As is the case with Pioneer 10, all systems aboard Pioneer 11 are performing nominally. Table 1 shows total tracking time for September and October.

D. Pioneer 12

In order to not interfere with Pioneer 11 Saturn Encounter Operations, the Pioneer-Venus Orbiter (Pioneer 12) was configured for a minimum support activity period from 19 August to 8 September 1979. Following this period, normal orbital operations did commence and Radio Science data gathering was reinstituted. All occultation and periapsis activities have occurred over the Australian facilities during this reporting period. These activities are discussed later in this article.

On 11 October, a successful Static Phase Error (SPE) test was performed on the spacecraft's receiver 2, clearing up some doubt as to its condition.

Also, during this period, a high-gain antenna (HGA) calibration was successfully performed on 17 October, over DSS 63 (Madrid, Spain). The overall tracking time for Pioneer 12 is shown in Table 1.

III. Special Activities

Following Pioneer 11's Saturn Encounter, the DSN began to support the occultation activity of Pioneer 12 again on 9 September. This began with 26-meter coverage at DSS 44 (Australia), and 64-meter coverage was reestablished on 5 October over DSS 43 (Australia).

There are three ongoing Radio Science Occultation Experiments:

(1) Radio Science Occultation I

(2) Radio Science Corona Turbulence

(3) Radio Science Occultation II

All three were discussed in detail in Reference 1.

The last hard occultation occurred on 9 December 1979, but data collection in support of Radio Science requirements will continue until 27 December 1979. The next period of hard occultation will begin in 1980.

IV. Summary

At this writing, all Pioneer Spacecraft appear to be in a healthy state with no apparent problems that would hinder nominal operations. The period of this report found all Pioneer Spacecraft in a cruise mode, with the exception of Pioneer 12's orbital activity. Therefore, no real significant events have occurred outside of normal operational support.

Reference

1. Howe, T. W., "Pioneer-Venus 1978 Mission Support," in *The Deep Space Network Progress Report 42-51*, pp. 19-30, Jet Propulsion Laboratory, Pasadena, California, June 15, 1979.

Table 1. Pioneer tracking coverage

Month	Pioneer	Station type	Number of tracks	Tracking time (hour: min)
September	6-9	26/34 m	0	00:00
		64 m	(PN 9) 1	03:00
	10	26/34 m	12	48:30
		64 m	51	235:41
	11	26/34 m	21	182:17
		64 m	90	749:35
	12	26/34 m	47	345:49
		64 m	13	48:03
October	6-9	26/34 m	0	00:00
		64 m		00:00
	10	26/34 m	13	60:35
		64 m	48	290:02
	11	26/34 m	36	242:14
		64 m	7	44:32
	12	26/34 m	35	225:07
		64 m	65	523:48